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ARTICLES

WHY THE CRISIS WAS UNAVOIDABLE AND WHY TARP DID NOT HELP

Aditya (Adi) Habbu

INTRODUCTION

Many politicians, economists, and academics have blamed the 2008 financial crisis on the greed of Wall Street.¹ Some argue that deregulation of the financial industry, predatory lending, and the pursuit of fees created the crisis which almost toppled our financial markets.² While greed, corruption, and deregulation may certainly have had a significant role in the crisis, this article suggests that the crisis was not necessarily the result of bad behavior by Wall Street. Instead, the crisis may have been unavoidable because of overly optimistic assumptions and simple agency conflicts.

Many have produced compelling empirical work to explain how various government policies and securitization exacerbated the crisis, however, given the complexity of the system, finding empirical proof for any set of causes is difficult.³ This article takes a different approach. To illustrate how agency conflicts and assumptions could have created this crisis, I will develop a set of simple economic models. These models will be over-simplified, yet will illustrate how bad behavior and predatory lending are not required to explain the collapse of

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1. Anup Shah, *Global Financial Crisis*, GLOBAL ISSUES (last updated Dec. 11, 2010), <http://www.globalissues.org/article/768/global-financial-crisis>.
 2. See Peter J. Wallison, *Barney Frank, Predatory Lending*, WALL ST. J., Oct. 15, 2009, <http://online.wsj.com/article/SB10001424052748704107204574475110152189446.html>.
 3. See Atif Mian & Amir Sufi, *The Consequences of Mortgage Credit Expansion: Evidence from the U.S. Mortgage Default Crisis*, 124 Q. J. ECON. 1449 (2009). Some have argued that oversupply of credit, perhaps, fueled by securitization and fee-generation played an essential role in the crisis. *Id.*; see also Adam J. Levitin & Susan M. Wachter, *Explaining the Housing Bubble* (Univ. of Pa. Inst. for Law & Econ. Res. Paper No. 10-15, 2010), available at <http://ssrn.com/abstract=1669401>. Others have suggested that government policy was the source of the crisis. See John B. Taylor, *The Financial Crisis and the Policy Responses: An Empirical Analysis of What Went Wrong* (Nat'l Bureau of Econ. Res., Working Paper No. 14631, 2009), available at <http://www.nber.org/papers/w14631>.

our banking infrastructure. Even if bad behavior *did* play a role, this model suggests that regulating bad behavior alone would not have been enough to avoid the crisis.

After using the model to demonstrate how the crisis may have occurred, I analyze how TARP I and TARP II could have impacted the problem. Further, I use this model to discuss what forms of capital injection might have been most valuable in stabilizing the banking sector. Then I discuss what types of regulation might have avoided this crisis based on the assumptions in my economic model. In particular, I conclude that the crisis may have been unavoidable without substantial intervention.

I begin by creating a simple model for understanding a bank's balance sheet, then I use this model to illustrate how loan default destabilized the banking sector. Section II discusses the basics of how to value a loan and Section III uses the tools of Section II to develop a model for understanding securitization of home loans. In particular, I discuss the agency conflicts created by securitization. Using the models of II and III, Section IV demonstrates how cheap credit and appreciating real estate prices created a reverse feedback loop that is at the heart of this crisis. Section V attempts to compile all the information from the previous sections to illustrate how the crisis happened. In addition, I highlight that although bad behavior plays no role in this particular model, the model explains an equally catastrophic result. Section VI discusses the intentions of TARP I and II and addresses what forms of capital injection may be most valuable from a prudential perspective. Finally, I close with an analysis that indicates that prior regulation may not have averted this crisis.

I. THE BANK'S BALANCE SHEET

I begin by looking at a bank's balance sheet and by determining the basics of how the crisis has crippled banks.⁴ A bank has assets, liabili-

4. Keep in mind that the example assumes a "dynamic" balance sheet not a GAAP balance sheet. In a dynamic balance sheet an accountant will mark to market all assets immediately. See Paraschivescu Marius Dumitru & Pacurari Doina, *Balance-Sheet Theories and Their Cognitive Dynamism*, 3 ANALELE UNIVERSITATII DIN ORADEA 1376, 1377 (2009) (Rom.). Thus the accountant will alter the assets to reflect their actual value instead of their book value. See Newt Gingrich, *Suspend Mark-To-Market Now!*, FORBES.COM (Sept. 29, 2008, 6:05 PM), http://www.forbes.com/2008/09/29/mark-to-market-oped-cx_ng_0929gingrich.html. Further, these adjustments will be made as soon as they become relevant instead of waiting till the end of the year. See *id.* A GAAP accounting balance sheet will leave most assets at book value. See STEPHEN G. MOYER, DISTRESSED DEBT ANALYSIS STRATEGIES FOR SPECULATIVE INVESTORS 45 (2005); see also Bruno Biais et al., *A Dynamic Theory of the Balance Sheet* (May 7, 2004) available at <http://www.wcas.northwestern.edu/csio/Conferences/CSIO-IDEI-2004/BMPRmay7.pdf>.

ties, and shareholders' equity like any other business.⁵ Like any other business, Assets = Liabilities + Shareholders' Equity.⁶ The assets are loans made to companies and individuals and a host of other securities.⁷ Often these loans are securitized loans;⁸ however, for now, only look at primary, non-securitized loans.⁹

In addition to assets/loans, banks also have liabilities and equity.¹⁰ Equity is the money that investors give to a company so that they have a claim on the residual profits of a company.¹¹ In the case of Citi, the equity is the stock of the company.¹² Each year, shareholders have a claim on all profits that a company makes.¹³ Assuming that liabilities stay fixed, if the value of the assets goes up then the value of equity also goes up.¹⁴ Likewise, if the value of the assets goes down then the value of equity also will go down.¹⁵

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5. Gaurav Akrani, *Balance Sheet of Commercial Bank- Liabilities and Assets*, KALYAN CITY LIFE BLOG (Sept. 24, 2010, 12:09 AM), <http://kalyan-city.blogspot.com/2010/09/balance-sheet-of-commercial-bank.html>.
 6. INT'L ACCOUNTING STANDARDS COMM., INTERNATIONAL ACCOUNTING STANDARDS EXPLAINED, 178-79 (2000) [hereinafter INTERNATIONAL ACCOUNTING EXPLAINED].
 7. *Id.*
 8. *Id.* at 447; see also Cameron L. Cowan, Partner, Orrick, Herrington & Sutcliffe, LLP, Am. Securitization Forum, Hearing on Protecting Homeowners: Preventing Abusive Lending While Preserving Access to Credit (Nov. 5, 2003).
 9. For purposes of this article the distinction between a bank and a bank holding company will not be discussed in detail. See ARTHUR SULLIVAN & STEVEN SHEFFRIN, *ECONOMICS: PRINCIPLES IN ACTION* 421 (2003) (explaining the distinction and the importance it plays in the banking system).
 10. See INTERNATIONAL ACCOUNTING EXPLAINED, *supra* note 6, at 179.
 11. Equity Capital, SPRINGBOARD ENTERPRISES, <http://www.springboardenterprises.org/learningcenter/equitymarketfundamentals/sourcesofcapital/equitycapital> (last visited Sept. 16, 2011).
 12. See Citigroup Financial Snapshot, CITIGROUP FIN., <http://www.citigroup.com/citi/fin/data/snapshot1103.pdf?ieNocache=10> (last visited Sept. 13, 2011).
 13. While this statement is true, a shareholder can only receive value from a company in the form of dividends. JOHN DOWNES & JORDAN ELLIOT GOODMAN, *DICTIONARY OF FINANCE AND INVESTMENT TERMS* 184 (6th ed. 2003). Thus, a company's stock price will be the discounted value of all expected dividends to the stockholder. John Y. Campbell & Albert S. Kyle, *Smart Money, Noise Trading and Stock Price Behavior*, 60 REV. ECON. STUD. 1 (1993). This level of detail is not relevant to my analysis. See generally WILLIAM MEGGINSON & SCOTT SMART, *INTRODUCTION TO CORPORATE FINANCE* (2008) (introducing the theoretical underpinning of stock prices).
 14. *Encyclopedia of Everyday Law*, ENOTES, <http://www.enotes.com/everyday-law-encyclopedia/shareholder-rights> (last visited Oct. 10, 2011). In reality liabilities will change regularly for a bank. THE NEW PALGRAVE *DICTIONARY OF MONEY & FINANCE* 121 (Peter Newman & Murray Milgate & John Eatwell eds. 1992). However, accounting for this movement does not add any value to my model. In addition, liability movements for a bank are not large enough to study in this case. Thus, I ignore a bank's changing liabilities for the purposes of my model.
 15. See ROBERT PARRINO & DAVID S. KIDWELL, *FUNDAMENTALS OF CORPORATE FINANCE* 57-58 (2009).

Banks also have liabilities.¹⁶ Speaking in generalities, which will be helpful to the model I will build, banks generally have three types of liabilities: 1) deposits; 2) long term debt; and 3) short term debt.¹⁷ Deposits are the accounts that corporations have at Citi.¹⁸ Long-term debts are the loans that the banks have taken from someone else.¹⁹ The bank must make regular payments on this debt.²⁰ Short-term debts are the loans that the bank must pay back within less than a year.²¹

If the loans and securities that make up a bank's assets significantly drop in value then the bank's assets may exceed its liabilities.²² When this happens the bank is insolvent and it has "failed."²³ This is essentially what happened to many banks in the U.S. during this crisis.²⁴ However, instead of holding one big loan to GE, Citi and UBS²⁵ had a number of Collateralized Debt Obligations as their Loan Assets that suddenly lost value.²⁶ The mechanics of Collateralized Debt are discussed in Section II and III. Notice that if a particular bank has more equity compared to debt, then a devaluing of the loans and securities

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16. GLENN G. MUNN, *ENCYCLOPEDIA OF BANKING FINANCE* 784 (1994).
 17. See Steve Kaplan, *The Bailout: A Primer*, FORBES.COM (Oct. 17, 2008, 12:01 AM), http://www.forbes.com/2008/10/16/bailout-primer-crisis-oped-cx-sk_1017kaplan.html.
 18. See 12 U.S.C.A. §1813 (West 2010).
 19. See JOHN GRAHAM, SCOTT B. SMART & WILLIAM L. MEGGINSON, *CORPORATE FINANCE: LINKING THEORY TO WHAT COMPANIES DO* 547 (Michael R. Reynolds ed., 3rd ed. 2007).
 20. See *id.*
 21. See *id.* This article does not discuss how bank liabilities are priced. However, this is also an interesting area of regulation policy. While not discussed here, it is feasible that uncertainty in liability values also contributed to the crisis. See Alessio M. Paces, *Uncertainty and the Financial Crisis* 21 (Eur. Corp. Governance Inst., Working Paper No. 159, 2010) available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1564103; see also Gary Gorton & Anthony M. Santomero, *Market Discipline and Bank Subordinated Debt*, 22 J. MONEY, CREDIT & BANKING 119, 119-28 (1990) (offering an introduction to banking liability valuation and the problems it may cause).
 22. See MORAD CHOUDRY, *BANK ASSET AND LIABILITY MANAGEMENT: STRATEGY, TRADING, ANALYSIS* 265 (2007).
 23. See Lee S. Alston, Wayne A. Grove & David C. Wheelock, *Why Do Banks Fail? Evidence from the 1920s*, 31 EXPLORATIONS IN ECON. HISTORY 409 (1994). There is a great deal of literature studying the past failures of banks. *Id.*
 24. See David S. Hilzenrath, *Year was Worst for Bank Failures Since S&L Crisis in 1992*, WASH. POST, Dec. 29, 2010, at A10.
 25. UBS was founded as Union Bank of Switzerland in the mid nineteenth century. See History of UBS, UBS, http://www.ubs.com/1/e/about/history/1850_1899/1850.html (last visited Apr. 3, 2012).
 26. See Carrick Mollenkamp, David Reilly & Edward Taylor, *Subprime Hits Seem Likely to Keep Coming; Banks Like UBS, Citi May Face More Charges Than They've Yet Taken*, WALL ST. J., Nov. 15, 2007, at C1. Appendix 1 includes an actual bank balance sheet. This helps the reader grasp the difference between a dynamic balance sheet and an actual GAAP balance sheet.

may not lead to a bank's failure.²⁷ However, banks traditionally operate with a leverage ratio of at least 1 to 12 and as much as 1 to 40.²⁸ Thus, banks could be made insolvent by even a minor devaluing of their loans and securities.²⁹

The types of Loan Assets that banks had on the asset side of their balance sheet are discussed in Section II and help illustrate how these assets lost value so quickly and how they lead to bank insolvency.

II. VALUING A HOME MORTGAGE LOAN

Many of the assets on the Loan Asset side of the Bank Balance Sheet were securitized home loans.³⁰ To understand how these assets lost value so quickly, I develop a simplified model for understanding how home loans are valued, and how they are valued after they are securitized.³¹

Suppose that all homes cost \$100 and there is only one type of home loan.³² The home loan allows one to borrow \$100 today at 10 percent interest. The \$100 with interest (\$110) is due back to the

27. Thomas F. Hellmann, Kevin C. Murdock, & Joseph E. Stiglitz, *Liberalization, Moral Hazard in Banking, and Prudential Regulation: Are Capital Requirements Enough?*, 90 THE AM. ECON. REV. 147 (2000).

28. See DANIEL K. TARULLO, BANKING ON BASEL: THE FUTURE OF INTERNATIONAL FINANCIAL REGULATION 147 (2008) (illustrating capital ratios for the ten largest banks in the United States as of December 31, 2003). Banking leverage ratios are strictly regulated by the Basel Accords. *Id.*; see also David Enrich, *Basel Rules on Track—New Capital, Leverage Limits on Banks*, WALL ST. J., July 17, 2010, at B4. There are different rules for bank holding companies and for investment banks. PRICEWATERHOUSECOOPERS, THE COMMERCIAL BANKING REGULATORY HANDBOOK 83-84 (2001). In addition, the Basel requirements arguably leave room for a bank to take on a considerable amount of risk without violating the Basel leverage ratios. See DANIEL K. TARULLO, BANKING ON BASEL: THE FUTURE OF INTERNATIONAL FINANCIAL REGULATION (2008).

29. See DANIEL K. TARULLO, BANKING ON BASEL: THE FUTURE OF INTERNATIONAL FINANCIAL REGULATION (2008).

30. Tara E. Gaschler, *Understanding the Securitization Process and the Impact on Consumer Bankruptcy Cases*, ABIWORLD.ORG (Dec. 2009) <http://www.abiworld.org/committees/newsletters/consumer/vol7num12/securitization.pdf>.

31. Again this will be a simplified version of home loan and collateralized debt valuation. I skip much of the analytic rigor that does not explicitly aid the present discussion. However, to learn more about the basic of asset back security valuation, see CHARLES STONE & ANNE ZISSU, THE SECURITIZATION HANDBOOK: STRUCTURE AND DYNAMICS OF MORTGAGE AND ASSET-BACKED SECURITIES 45-80 (2005).

32. This is substantial oversimplification. There are a number of different types of home loans available to a consumer. One of the mortgages available is called an adjustable rate mortgage (ARM). The interest rate on these mortgages is pegged to a financial index such as LIBOR. Sandra Block, *Brace Yourself if You Have a LIBOR-linked ARM*, USATODAY.COM (Oct. 22, 2008) http://www.usatoday.com/money/perfi/columnist/block/2008-10-20-ym-libor-arm-mortgage_N.htm. Some have suggested that these mortgage are sold to ill-informed individuals who will not be able to pay off their loan if the rate increases. See Glenn Setzer, *Option ARMs At The Center of*

bank in one year. In addition, assume that there is a risk-free rate of 6 percent.³³ This means that the bank could make a 6 percent return on \$100 without taking any risk by merely investing in U.S. treasuries. Further assume that all banks know that 50 percent of people can pay back the loan while 50 percent cannot pay it back. In the event that the individual cannot pay the loan back, the bank is able to seize the house which will be worth the same \$100 in a year. At this point in the scenario, there is no securitization of these loans.

If the Bank gives loans randomly, then the expected value of the loan will be $(50\% \times 110) + (50\% \times 100) = \105 .³⁴ But if the bank instead just invests in U.S. treasuries, it will make a return in one year of \$106. Thus, the bank will not give loans randomly. If a bank has to put its money at risk, it will go out of its way to make sure that an individual that wants a loan is one of the 50 percent that will pay the loan back.³⁵ It does not want to take the risk of losing money compared to a risk free investment.³⁶

Now assume that housing prices are appreciating at a rate of 5 percent. If the Bank randomly gives loans, then the expected value of the loan will be $(50\% \times 110) + (50\% \times 105) = \107.50 .³⁷ Thus, a bank could start making loans to people randomly and it would still be better off than if it invested in risk-free treasuries.

Thus, in the current model, appreciating house prices could make it profitable to give home loans to both creditworthy and non-creditworthy individuals.³⁸ This conflict becomes more difficult to manage when these loans are securitized.³⁹ I discuss how loans are securitized in the next section.

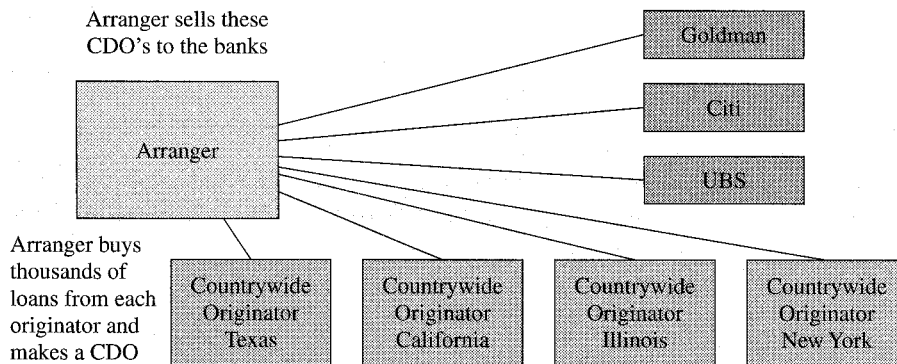
Rate Shock Fears, MORTGAGENEWSAILY.COM (Sept. 11, 2006) http://www.mortgagenewsdaily.com/9112006_Option_ARM_Mortgage.asp.

33. This is merely an illustration. The treasury rate usually varies between 3 – 5%. See *Treasury Bill (T-Bill) Indexes*, MORTGAGE-X, <http://mortgage-x.com/general/indexes/t-bill.asp> (last visited Sept. 22, 2011).
34. For more on expected values and their application to law, see RICHARD POSNER, *AN ECONOMIC ANALYSIS OF THE LAW*, (5th ed. 2006).
35. See *Treasury Bill (T-Bill) Indexes*, MORTGAGE-X, <http://mortgage-x.com/general/indexes/t-bill.asp> (last visited Sept. 22, 2011).
36. See *The Debt-Ceiling Debate: The Death of the “Risk-Free” Investment*, MONEY MORNING (July 28, 2011), <http://moneymorning.com/2011/07/28/the-debt-ceiling-debate-the-death-of-the-risk-free-investment/>.
37. Note that I am currently assuming that the banks are loaning “randomly.” This is not to imply that the banks are not screening individuals at all. Instead, I am trying to model a scenario in which the banks are only doing a cursory screening and not a more rigorous analysis. This assumption is consistent with the behavior of home loan originators before the financial collapse. See Gretchen Morgenson, *Inside the Countrywide Lending Spree*, N.Y. TIMES, (Aug. 26, 2007), <http://www.nytimes.com/2007/08/26/business/yourmoney/26country.html>.
38. It is quite clear that there was a substantial increase in housing prices in the years before the crisis. See Jonathan McCarthy & Richard W. Peach, *Are Home Prices the Next Bubble?*, 10 ECON. POL’Y REV. 1, 1 (2004).
39. See discussion *infra* Section III.

III. SECURITIZING HOME LOANS

Above I described the behavior of a corner store bank that keeps and services all the loans that it originates. Now I look at a situation in which there are no corner banks that hold on to all the loans that they originate; instead, there is a Countrywide at each corner.

Countrywide is a loan originator, and after it has made a loan to an individual it sells the right to that loan to an Arranger.⁴⁰ An Arranger buys loans from Countrywide locations all over America and creates Collateralized Debt Obligation (CDO).⁴¹ A CDO dices up all the cash flows generated by these thousands of individual home loans and sells these securities (CDOs) to the banks and other institutional investors.⁴²



The banks UBS, Goldman, Citi, etc. would rather own a piece of a CDO than an individual loan because there is more diversification and thus less risk to owning a single loan.⁴³ If UBS owned only loans

40. See Adam B. Ashcraft & Til Schuermann, *Understanding the Securitization of Subprime Mortgage Credit*, 318 FED. RES. BANK OF N.Y. STAFF REP. 1, 5 (2008) (describing the process by which loans are sold to an arranger by a loan originator). Countrywide is the third largest Subprime Mortgage Originator. *Id.* at 4.

41. See Adam B. Ashcraft & Til Schuermann, *Understanding the Securitization of Subprime Mortgage Credit*, 318 FED. RES. BANK OF N.Y. STAFF REP. 1, 3-4 (2008); see also STAFF ON S. COMM. ON HOMELAND SECURITY AND GOVERNMENTAL AFFAIRS, 111TH CONG., REP. ON WALL STREET AND THE FINANCIAL CRISIS: ANATOMY OF A FINANCIAL COLLAPSE 1, 251 (Comm. Print 2011) (describing the process by which arrangers create CDOs and the many methods of diversification including geographic diversification).

42. See *Collateral Debt Organizations Time Topic*, N.Y. TIMES, available at <http://topics.nytimes.com/topics/reference/timestopics/subjects/c/collateralized-debt-obligations/index.html> ("CDOs are created by banks that pool together otherwise unrelated debt-instruments, like bonds, and then sell shares of that pool to investors").

43. See FINANCIAL CRISIS INQUIRY COMMISSION, THE FINANCIAL CRISIS INQUIRY REPORT: FINAL REPORT OF THE NATIONAL COMMISSION ON THE CAUSES OF THE FINANCIAL AND ECONOMIC CRISIS IN THE UNITED STATES 1, 193-94 (2011) (explaining the effect of geographic diversification on CDOs).

from Texas then a natural disaster in Texas that destroyed all the homes would make all of UBS's loans worthless. Instead, if UBS owns a CDO that is funded by loans from all over the country, then no natural disaster could entirely devalue all of UBS's loans.⁴⁴ Any one disaster would have less impact. Thus, it is best for the bank to own CDOs instead of individual loans.⁴⁵

Pricing the CDO

Now it must be determined what price the arranger will pay to each Countrywide location for a loan and it must be determined what price the banks will pay for the CDO. In order to do this, I will step through all the agency problems that exist in this arrangement; for the purposes of the following example assume that the arranger only pays one price to all Countrywide locations.⁴⁶

Because each Countrywide location knows that they will get a fixed price per loan, each location will have little or no motivation to check

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44. PATRICIA A. MCCOY & ELIZABETH RENUART, JOINT CTR. FOR HOUS. STUDIES, HARVARD UNIV., THE LEGAL INFRASTRUCTURE OF SUBPRIME AND NONTRADITIONAL HOME MORTGAGES 7-10 (2008), available at http://www.jchs.harvard.edu/publications/finance/understanding_consumer_credit/papers/ucc08-5_mccoy_renuart.pdf. A properly diversified mortgage backed security would not be diversified based on geography alone. It would also be diversified based on the credit ratings of the borrowers, the price range of the house that was bought, the type of neighborhood that the houses were located, etc. See Markus K. Brunnermeier, *Deciphering the Liquidity and Credit Crunch 2007-2008*, 23 J. OF ECON. PERSP. 77 (2009) available at www.princeton.edu/~markus/research/papers/liquidity_credit_crunch.pdf. The arrangers may have added another level of risk by only bundling subprime mortgages with one another. Thus, instead of diversifying risk, the risk of subprime lenders defaulting was concentrated into a number of mortgage backed securities.
45. While not directly relevant to this discussion, it is interesting to note that some research indicates that banks are not as well diversified as they should be. See ANDREAS KAMP ET AL., DO BANKS DIVERSIFY LOAN PORTFOLIOS? A TENTATIVE ANSWER BASED ON INDIVIDUAL BANK LOAN PORTFOLIOS (2005).
46. This simplifying assumption is an accurate representation of reality if we assume that the costs of monitoring each Countrywide are very high. For example, assume that the arranger will only pay full price for "high quality" loans. The arranger would need a system of monitoring whether or not a given Countrywide location is generating high quality or low quality loans. See Kenneth J. Kopecky & David D. VanHoose, *Capital Regulation, Heterogeneous Monitoring Costs, and Aggregate Loan Quality* (Baylor U. Hankamer Sch. of Bus., Working Paper No. 2005-060-ECO, 2004), available at http://business.baylor.edu/economics_papers/EWPS060.pdf. This would be very expensive to enforce. See *id.* The arranger would have to establish a loan standards protocol and he would then have to monitor the originator closely. Instead, the arranger could rationally assume that each Countrywide location will sell him a mix of GOOD and BAD securities. This is the method used in this model. "An originator is an entity that initiates a funds transfer subject the UCC article 4A." Black's Law Dictionary 1210 (9th ed. 2009).

if a person is creditworthy.⁴⁷ Each Countrywide employee is paid on a commission which is based on the volume of loans that he generates.⁴⁸ Thus, locations are incentivized to generate many loans regardless of whether they are good loans or bad loans.⁴⁹

The arranger understands that this incentive structure exists. But the arranger does not have the resources to check which Countrywides have good and bad procedures.⁵⁰ So he builds this uncertainty into the single price he pays all Countrywide locations for a loan.⁵¹ He assumes that 50 percent of Countrywide locations have GOOD credit check procedures and that 50 percent of Countrywide facilities have BAD credit check procedures. A GOOD credit procedure is a Countrywide that makes 60 percent of their loans to people that will pay back the loan and 40 percent of their loans to people that will not pay back the loan. The value of a GOOD loan is $(40\% \times 105) + (60\% \times 110) = \108 . A BAD credit procedure is a Countrywide that makes 60 percent bad loans and 40 percent good loans. Thus each loan from a BAD Countrywide is worth $(60\% \times 105) + (40\% \times 110) = \107 . Since the arranger knows that 50 percent of the loans are from GOOD Countrywide locations and 50 percent of the loans will be from BAD Countrywide locations, he is willing to pay $(50\% \times 107) + (50\% \times 108) = \107.50 per loan.⁵²

Assume that there are only four Countrywide locations which each generate 1,000 loans and that four banks each buy a quarter of the

47. Note that this assumption creates a bit of a circularity problem. One could argue that the arranger's decision to only pay one price leads to poor quality controls at origination. Or, one could argue that poor quality controls force the arranger to pay one price for all mortgages. However, I ignore this circularity issue since it does not affect the outcome of our analysis.

48. This is a reasonable approximation of the employee incentives before the crisis. See GOPI MATTEL, MORTGAGE BROKER COMMISSIONS AND INCENTIVES - A PRIMER (2009), available at <http://www.qcommission.com/doc/Mortgage-Broker-SalesCommissions-A-Primer-Article.pdf>.

49. Gretchen Morgenson, *Inside the Countrywide Lending Spree*, N.Y. TIMES, (Aug. 26, 2007), <http://www.nytimes.com/2007/08/26/business/yourmoney/26country.html>.

50. *Id.*

51. See Abigail Field, *Bank of America Sued for Countrywide's Mortgage Sins, Again*, DAILYFINANCE (Jan. 25, 2011, 3:48 PM), <http://dailyfinance.com/2011/01/25/bank-of-america-sued-for-countrywides-mortgage-sins-again/>.

52. Before the crisis, many originators were issuing loans with few, if any, credit check procedures or covenants. "If you had a pulse, we gave you a loan": Inside, the fiasco that led to the mortgage mess and Countrywide's collapse, DATELINE NBC (Mar. 22, 2009, 7:32 PM), http://www.msnbc.msn.com/id/29827248/ns/datetime_nbc-the_hansen_files_with_chris_hansen/t/if-you-had-pulse-we-gave-you-loan/. These were called Covenant Lite loans. See Bolton Warns of Bubble Fuelled by "Cov-Lit" Loans, FIN. TIMES (May 18, 2009), <http://www.ft.com/intl/cms/s/2/6d754668-0531-11dc-b151000b5df10621.html#axzz1X1E2Mb4h>. Some feared that these would lead to a housing bubble. See *id.* In particular, an analyst at Fidelity named Anthony Bolton argued that cov-lit would be the "the tinder paper for a serious reversal in the market." *Id.*

CDO from the arranger at the face value paid by the arranger.⁵³ Thus, the arranger pays $(4 \times 1,000 \times 107.5) = \$430,000$ total to all the Countrywide originators, and each Bank pays \$107,500 for one quarter of the CDO. These numbers are not used now but they will become relevant in Section V.

Now, between Section III and IV, there is a model for understanding home loan prices and home loan securitization. Before combining all these sections to analyze the model it is necessary to study another element of the mortgage market: the connection between cheap credit and appreciating real estate prices.

IV. THE RELATIONSHIP BETWEEN REAL ESTATE PRICES AND CHEAP CREDIT

This section argues that it is possible for cheap credit to create real estate appreciation and for real estate appreciation to make credit cheaper.⁵⁴ This relationship, and the fact that few realized this relationship, will play an integral role in the Section V analysis of the 2008 Mortgage Crisis.⁵⁵

Again I begin with a set of assumptions. First I assume that there is only one kind of house. This house sells for \$100. Assume that all individuals get the same interest rate of 10 percent. There are some individuals that can afford this interest rate and others that cannot.

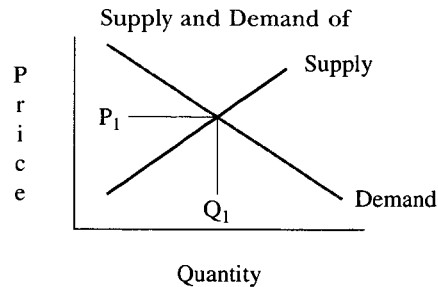
53. The estimated size of the U.S. asset backed securities market is \$8.9 trillion. David S. Evans & Joshua D. Wright, *The Effect of the Consumer Financial Protection Agency Act of 2009 on Consumer Credit*, 22 LOY. CONSUMER L. REV. 277, 291 (2010).

54. Before proceeding, it is important to define the term "cheap credit." Credit should be priced based on the risk involved in a given transaction. See *Loan Pricing Disclosure*, WELLS FARGO HOME MORTG., <https://www.wellsfargo.com/mortgage/rates/pricingdisclosure> (last visited Sept. 23, 2011). For a home loan, this includes that value of the collateral (the house) and the likelihood that the borrower will be able to pay back the loan. See *id.* If credit is offered at a rate that does not compensate for these risks then the credit is "Cheap." See REGIME CHANGES: MACROECONOMIC POLICY AND REGULATION IN EUROPE FROM THE 1930s TO THE 1990s 184-90 (Douglas J. Forsyth & Ton Notermans eds., 1997). There are many moving parts in macroeconomic credit policy. See *id.* The Federal Reserve has broad discretion to manipulate the rate at which credit is made available to the banks. THE FEDERAL RESERVE SYSTEM: PURPOSES AND FUNCTIONS 46 (9th ed. 2005), available at http://www.federalreserve.gov/pf/pdf/pf_complete.pdf. This in turn will affect that rate at which consumers are lent credit. See *id.* While this is an important issue, I will not discuss the macroeconomic issues or the discretion of the Federal Reserve in this article. See Christina D. Romer & David H. Romer, *Federal Reserve Information and the Behavior of Interest Rates*, 90 THE AM. ECON. REV. 429, 429-57 (2000) (discussing the Federal Reserve's impact on the interest rates).

55. John Paulson, the manager of a small hedge fund, recognized the problem in housing two years in advance and traded on his hunch to make an enormous amount of money. See Gregory Zuckerman, *Trader Made Billions on Subprime*, WALL ST. J., (Jan. 15, 2008), <http://online.wsj.com/public/article/SB120036645057290423.html>.

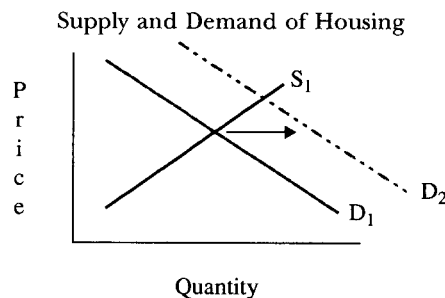
However, those that cannot afford 10 percent interest rates may be able to afford a lower interest rate.

Based on the current availability of houses on the market and the price of financing, the supply and demand of houses is at an equilibrium price and quantity.



The equilibrium price (P_1) is currently \$100.

Now assume that by government action the standard rate of interest reduces to 9 percent. More people will now be able to afford houses.⁵⁶ Thus, there will be more demand for houses.⁵⁷ This will result in an outward shift of the demand curve.

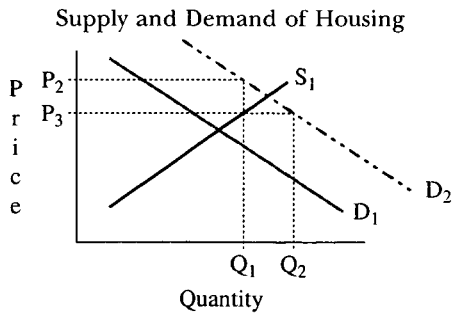


Note that because houses take time to build, there will only be Q_1 houses available. This means that housing prices will temporarily spike to P_2 before supply catches up and it finally settles at the new equilibrium price of P_3 . Regardless, home values have permanently increased.⁵⁸

56. SUZANNE TRIMBATH & JUAN MONTOYA, HOUSING AFFORDABILITY IN THREE DIMENSIONS: PRICE, INCOME AND INTEREST RATES 3 (2002).

57. *Id.*

58. There is strong empirical evidence to suggest that housing prices were increasing rapidly in the years before the bubble. See Nathalie Girouard et al., *Recent House Price Developments: The Role of Fundamentals* 5-8 (Org. for Econ. Cooperation and Dev., Working Papers No. 475, 2006).



This permanent increase in housing prices could have an effect on the rate of credit.⁵⁹ Consider the home loan pricing model that was discussed in Section II. Originally the price of the house in the event of a foreclosure was a relevant factor in how a loan was priced.⁶⁰ If Countrywide assumed that 50 percent of people would default, then, in the event of default, Countrywide would only receive the value of the house plus the rate of appreciation.⁶¹

Thus the value of a loan for Countrywide was:

$$(100 \times (1+10\%) \times 50\%) + (100 \times (1+5\%) \times 50\%) = \$107.50.$$

But if the increased demand in housing has increased the rate of appreciation in housing to 6 percent instead of 5 percent then Countrywide's new loan value is:

$$(100 \times (1+10\%) \times 50\%) + (100 \times (1+7\%) \times 50\%) = \$108.50.$$

In Section III Countrywide is paid a fixed amount for each loan.⁶² I assume that the arranger pays Countrywide \$107.50 for each loan. Countrywide does not want to give the arranger a more valuable loan.⁶³ Instead, each Countrywide corner store would rather generate more loans and keep the value of the loan exactly the same.⁶⁴ Thus, Countrywide will lower its interest rate so that the loans are each still worth \$107.50.

$$(100 \times (1 + x) \times 50\%) + (100 \times (1+7\%) \times 50\%) = \$107.50$$

$$x = (107.5 - 53.5)/50 - 1$$

$$x = 8\%$$

So Countrywide will reduce their rates to 8 percent.

This may again result in an increase in housing prices which would, in turn, reduce the rate of credit. Thus, our model is never in a static equilibrium; instead it is evolving and changing over time.⁶⁵

59. *Id.* at 31.

60. *See supra* Section II.

61. *See supra* Section II.

62. *See supra* Section III.

63. *See supra* Section III.

64. *See supra* Section III.

65. Researchers at the Santa Fe Institute are currently trying to understand how financial markets can be better understood using non-linear, none-

In this economic model, it seems feasible that cheap credit increased houses prices which in turn decreased the rate on home loan credit.

With all these building blocks in place, I can now turn to an analysis of how a few incorrect assumptions could have created the Housing Crisis of 2008.

V. EXPLAINING THE FINANCIAL CRISIS

Sections I – IV to demonstrate how rational mispricing could have created bank insolvency. I will begin by combining the pricing models of the previous sections into one pricing model.

Below are all the assumptions made by the arrangers and by the Countrywide installations when pricing loans. The following chart shows that arrangers will buy loans from both Countrywides with GOOD and BAD credit checks for \$107.50 if we make the below assumptions about house appreciation and about default rates.

equilibrium dynamics like the one described here. J. Doyne Farmer & John Geanakoplos, *The Virtues and Vices of Equilibrium and the Future of Financial Economics*, WILEY PERIODICALS, INC., Vol. 14, No. 3, available at <http://cowles.econ.yale.edu/~gean/art/p1274.pdf>. In the book, *Origins of Wealth*, Eric Beinhocker discusses the most recent research of Doyne Farmer. ERIC. D. BEINHOCKER, *THE ORIGIN OF WEALTH: EVOLUTION, COMPLEXITY, AND THE RADICAL REMAKING OF ECONOMICS* (2006). Farmer is attempting to debunk the long held belief that markets actually ever reach a point of equilibrium. *See id.* Traditional economic theory argues that stock prices are determined entirely by the fundamental value of each underlying company. BEINHOCKER, *supra*, at 393. According to the traditional view, any variation around the “true market price” is merely random noise. *Id.* This must be the case because if there was a mispricing in the market, traders would quickly arbitrage these profits away. *Id.* at 396. Farmer’s research, however, indicates that mispricings and trends can exist without being entirely arbitrated away for months and years. *Id.* Farmer argues that this is possible because financial markets have no static equilibrium; instead they are constantly evolving “ecosystems.” *Id.* at 396-97. Beinhocker likens the traders’ struggle to that of a person adjusting the temperature of a shower. *Id.* In the model I created, the interest rate’s behavior is non linear. As predicted by Farmer, it would be difficult to devise a trading strategy that would bring this feedback loop to any sort of equilibrium. *See id.* None of the people who made money trading on the crisis made their money by exploiting the interest rate trade, but instead bet against the bubble. *See* ERIC BEINHOCKER, *THE ORIGINS OF WEALTH* 391-98 (2006).

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Loan pricing by CountryWide

Loans for GOOD CREDIT CountryWide installations		
(a)	Percentage of loans assumed to be GOOD	60.0%
(b)	Percentage of loans assumed to be BAD	40.0%
(c)	Value of a home at time one	100.0
(d)	Interest rate on loan	10.0%
(e)	Rate of home price appreciation	5.0%
(f)	Loan value of GOOD CREDIT CountryWide loans	$108.0 = (a)(c)(1+d) + (b)(c)(1+e)$
Loans for BAD CREDIT CountryWide installations		
(g)	Percentage of loans assumed to be GOOD	40.0%
(h)	Percentage of loans assumed to be BAD	60.0%
(l)	Value of a home at time one	100.0
(j)	Interest rate on loan	10.0%
x (k)	Rate of home price appreciation	5.0%
(l)	Loan value of BAD CREDIT CountryWide loans	$107.0 = (g)(l)(1+j) + (h)(l)(1+i)$

Pricing of CDOs by Arranger

(m)	Percentage of loans from GOOD Credit CountryWides	50.0%
(n)	Percentage of loans from BAD Credit CountryWides	50.0%
(o)	Price paid by Arranger for each loan	$107.5 = (m)(f) + (n)(l)$
(p)	Number of CountryWide installations	4.0
(q)	Number of loans bought from each installations	1000.0
(r)	Value of CDO	$430,000.0 = (o)(p)(q)$
(s)	Value of loan sold to each bank	$107,500.0 = (r)/(p)$

If we then assume that all banks have a leverage ratio of 20 to 1 and that each bank has 50 percent of its assets in the form of CDOs, we can look at the banks' current balance sheet below and see that it is solvent.⁶⁶

66. These portfolio assumptions are merely illustrative. They do not represent the actual composition of bank balance sheet.

Assets		Liabilities	
CDO	107,500.0	Deposits	68083.4
Other Loans	107,500.0	Long term	68083.4
		Short term	68083.4
		Equity	
		Equity	10749.8

Now I will analyze the effect of both unrealistic housing appreciation (Section IV) and the agency conflicts of securitization (Sections II and III) to explain how the banks became insolvent.

Unrealistic Housing Appreciation

As was shown in Section II, a great deal of a loan's value is based on the foreclosure value of a home.⁶⁷ The value of a home is in large part based on its appreciation value. It is possible that, as argued in Section IV, appreciation in home price value was not an economic appreciation and was merely an artificial appreciation fueled by cheap credit.⁶⁸ If few investors recognized the relationship between cheap credit and appreciating housing prices, the housing appreciation would be a constant in all loan pricing models and the value of a loan would be artificially high.⁶⁹

However, once this housing appreciation bubble bursts, home prices would crash and subsequently the value of all these home loans would crash. In our model, home loans only need to decrease by 16.5 percent before the Bank is made insolvent.⁷⁰

67. See *supra* Section II.

68. See *supra* Section IV.

69. See *supra* Section IV.

70. Keep in mind that I am using a dynamic balance sheet; assets will be market to market. Thus, unlike a GAAP balance sheet, the assets are being changed immediately if a particular event results in an economic devaluation of the assets. This stands in sharp contrast to the GAAP rules. Marv Dumon, *Mark to Market: Tool or Trouble?* INVESTOPEDIA (May 8, 2009), <http://www.investopedia.com/articles/fundamental-analysis/09/mark-to-market-accounting.asp#axzz1YopqbjQY>. In GAAP accounting a devalued asset may be kept on the balance sheet at book value. *Id.* Further, if the bank does decide to write down the asset, this affect would not be reflected on the company's balance sheet till the end of the quarter or the year. *Id.*

(e) Rate of home price appreciation -16.5%

Assets		Liabilities	
CDO	96,750.0	Deposits	68083.4
Other Loans	107,500.0	Long term	68083.4
		Short term	68083.4
		Equity	
		Equity	-0.2

Thus without aggressive home loan sales tactics, and without any agency conflict created by securitization, a mere decrease in housing prices can make the banks insolvent. Notice that it is a reasonably high leverage ratio (20:1) that allowed the bank to become insolvent.

However, agency conflicts between Countrywide Corner Stores and arrangers probably did play a significant role in the crisis. So, I will show this relationship may have also lead to bank insolvency.

Agency Conflicts in Securitization

As I discussed earlier, there are two agency conflicts in my home loan model. The first is the conflict between individuals and Countrywide and the second is the conflict between Countrywide and the arranger.

Countrywide only wants to loan to people that will pay back the loan. We have assumed that each Countrywide location has a credit check system. Some Countrywides have GOOD credit check systems and thus they give 60 percent GOOD loans and 40 percent BAD loans. Other Countrywides have BAD credit check systems and thus they give only 40 percent GOOD loans and 60 percent BAD loans. We have assumed that the arranger believes that 50 percent of the Countrywides have GOOD credit check systems and 50 percent do not.

In my model, the arranger pays a fixed fee to all Countrywide locations. Since these locations do not have to hold onto the loan and since they are paid by volume of loans generated, all Countrywide locations have an incentive to stop performing credit checks and give as many loans as possible.

However, even assuming that all Countrywide locations only give 5 percent GOOD loans, and that the arranger has not priced this agency conflict, this is still not enough to make the banks insolvent in my model.

Loans for GOOD CREDIT CountryWide installations

(a)	Percentage of loans assumed to be GOOD	5.0%
(b)	Percentage of loans assumed to be BAD	95.0%

Loans for BAD CREDIT CountryWide installations

(g)	Percentage of loans assumed to be GOOD	5.0%
(h)	Percentage of loans assumed to be BAD	95.0%

Assets		Liabilities	
CDO	105,250.0	Deposits	68083.4
Other Loans	107,500.0	Long term	68083.4
		Short term	68083.4
		Equity	
		Equity	8499.8

Thus, within this model, agency conflict alone cannot explain bank insolvency. However, if we assume the above agency problem coupled with a modest 4 percent decline in housing prices, we see that the banks can easily become insolvent.

(e)	Rate of home price appreciation	-4.0%
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Assets		Liabilities	
CDO	96,700.0	Deposits	68083.4
Other Loans	107,500.0	Long term	68083.4
		Short term	68083.4
		Equity	
		Equity	-50.2

Agency conflicts and the poor incentives of Countrywide are not enough, in my model, to explain the housing crisis. Inflated home prices and the decline in home value are what seem to fuel the crisis.⁷¹ Inflated home prices were not the result of any bad behavior.⁷² They were merely the result of overly bullish expectations by the entire mar-

71. Mara Hart, Comment, *Transparency in Lending in the United States and the United Kingdom: Which Business Model Does it Best?* 30 N.W. K. INT'L L. & BUS. 461, 470 (2010).

72. *Id.*

ket.⁷³ It seems clear that while securitization and predatory lending may have been rampant, it is not clear that this created the crisis.

Combining Housing Prices and Agency Conflict

Assume that agency problem played some role and that houses prices also contributed to the insolvency problem in the banks. Assuming that all Countrywide locations reduce their volume of GOOD loans by 20 percent, a 9 percent decrease in housing prices will result in bank insolvency.

Loan pricing by CountryWide (Assuming Agency Problems)

Loans for GOOD CREDIT CountryWide installations

(a)	Percentage of loans assumed to be GOOD	40.0%
(b)	Percentage of loans assumed to be BAD	60.0%
(c)	Value of a home at time one	100.0
(d)	Interest rate on loan	10.0%
(e)	Rate of home price appreciation	-9.0%
(f)	Loan value of GOOD CREDIT CountryWide loans	$98.6 = (a)(c)(1+d) + (b)(c)(1+e)$

Loans for BAD CREDIT CountryWide installations

(g)	Percentage of loans assumed to be GOOD	20.0%
(h)	Percentage of loans assumed to be BAD	80.0%

Assets		Liabilities	
CDO	96,700.0	Deposits	68083.4
Other Loans	107,500.0	Long term	68083.4
		Short term	68083.4
		Equity	
		Equity	-50.2

Again, in this model, it appears that slight incentive mistakes and zero knowledge of inflated housing prices could have created this crisis without any type of predatory lending or other Wall Street misbehavior.

VI. CAPITAL INJECTION PROGRAMS

Looking at one of the insolvent bank balance sheets there are three possible steps that the government could take to correct the insolvency problem of the banking system: 1) buy troubled assets; 2) inject

73. *Id.*

equity directly into the banks; and 3) try to make the CDOs more valuable.

Buying Troubled Assets

Within my model a troubled asset buyback program by the government would not be effective at solving the insolvency problem.

Consider the insolvent balance sheet.

Assets		Liabilities	
CDO	96,700.0	Deposits	68083.4
Other Loans	107,500.0	Long term	68083.4
		Short term	68083.4
		Equity	
		Equity	-50.2

Now assume that the government buys all the CDOs at face value.

Assets		Liabilities	
CDO	96,700.0	Deposits	68083.4
Cash	96,700.0	Long term	68083.4
Other Loans	107,500.0	Short term	68083.4
		Equity	
		Equity	-50.2

This does not alleviate the insolvency problem. The bank is still insolvent.

CDO buyback was the central plan behind TARP 1.⁷⁴ However, at the time of TARP 1, Secretary of the Treasury Henry Paulson did not realize that the banks were insolvent.⁷⁵ The Treasury believed that

74. 12 U.S.C.A. § 5211(a)(1) (West 2008) (“The Secretary is authorized to establish the Troubled Asset Relief Program (or “TARP”) to purchase, and to make and fund commitments to purchase, troubled assets from any financial institution, on such terms and conditions as are determined by the Secretary, and in accordance with this chapter and the policies and procedures developed and published by the Secretary.”).

75. See Brian Carny, *Bernanke is Fighting the Last War*, WALL ST. J., Oct. 18, 2008 at A11 (alteration in original) (quoting Anne Schwartz), available at <http://online.wsj.com/article/SB122428279231046053.html> (“The Fed has gone about as if the problem is a shortage of liquidity. That is not the basic problem. The basic problem for the markets is that [uncertainty] that the balance sheets of financial firms are credible”).

the banks merely had a liquidity problem⁷⁶ in that the banks were solvent but that because CDOs could not be sold easily, the banks did not have enough cash on hand for everyday working capital.⁷⁷

Thus, a troubled asset buyback by the government is not aimed at solving bank insolvency, it is aimed at solving liquidity problems.⁷⁸ Because the problem with the banks was not a liquidity problem but was instead a solvency problem, TARP 1 failed.

Equity Injection

An equity injection into the banks would solve the insolvency problem. In TARP II the government realized that there was an insolvency problem.⁷⁹ So they took two primary steps:

1) they insured all Bank Short Term Debt;⁸⁰ and 2) they injected capital directly into the banks.⁸¹ Looking at my balance sheet, this does in fact solve the problem of insolvency, but it is also very expensive.

Assets		Liabilities	
Cash	1,000.0	Deposits	68,083.4
CDO	96,700.0	Long term	68,083.4
Other Loans	107,500.0	Short term	68,083.4
		Equity	
		Equity	949.8

Increasing the Value of CDOs

The third way of solving the bank insolvency problem would be to increase the value of all home loans. Practically, this is very difficult to do and requires substantial transaction costs. But, it may be the best option.

76. See *id.*; see also Gerard Baker, *If Hank Paulson is Wrong, We can Only Pray*, THE TIMES (Sept. 29, 2008), <http://timesonline.co.uk/tol/comments/columnists/article4842926>.

77. *Id.*

78. Interview with Professor Steven Kaplan, Neubauer Family Professor of Entrepreneurship and Finance, University of Chicago Graduate School of Business.

79. *Treasury Prepares for a TARP-and-Switch. And It's a Good Thing*, TIME (Oct. 8, 2008 at 3:49 pm), http://curiouscapitalist.blogs.time.com/2008/10/08/treasury_prepares_for_a_tarpan/.

80. See *The Doctor's Bill*, THE ECONOMIST (Sept. 25, 2008), <http://www.economist.com/node/12305746>.

81. See Yomarie Silva, *Developments in Banking and Financial Law: 2008-2009*, 28 Ann. Rev. Banking & Fin. L. 115-16 (2009); see Kimberly Amadeo, *What Exactly Was the Bank Bailout Bill?*, ABOUT.COM (Sept. 24, 2011), http://useconomy.about.com/od/criticalissues/a/govt_bailout.htm

As discussed earlier, plummeting home prices are really the backbone of the financial crisis in my model.⁸² Consider the final scenario of Section V. In this scenario, I combined a 9 percent decrease in housing prices with a 20 percent decrease in GOOD loans across all Countrywides. This combination resulted in the banks becoming insolvent. However, in my model, if housing prices were reinvigorated so that they only declined by 8 percent instead of the original 9 percent, then the bank would no longer be insolvent.⁸³

(e) Rate of home price appreciation -8.0%

Assets		Liabilities	
CDO	97,400.0	Deposits	68,083.4
Other Loans	107,500.0	Long term	68,083.4
		Short term	68,083.4
		Equity	
		Equity	649.8

Increasing housing prices, however, would be quite a herculean task for the U.S. Government.⁸⁴ However, in some ways this is what the Obama administration is trying to do.⁸⁵ For example, the administration would like to give homeowners more options to refinance their homes.⁸⁶ In addition, President Obama plans to allow bankruptcy judges to rewrite mortgage terms so that foreclosure is not the only option.⁸⁷ This might increase the value of individual loans which ultimately would increase the value of CDOs.⁸⁸

However, even if these measures could increase the value of home loans and CDOs, market confidence is so shaken right now that it is not clear that CDOs would be given the appropriate valuation.⁸⁹ If

82. See *supra* Section V.

83. See *supra* chart accompanying Section V.

84. See *infra* note 98 and accompanying text.

85. See *infra* note 105 and accompanying text.

86. See Barack Obama, President of the United States of America, Remarks by the President on the home mortgage crisis (Feb. 18, 2009, 10:25 a.m.), available at <http://www.whitehouse.gov/the-press-office/remarks-president-mortgage-crisis>.

87. See *id.*

88. See *supra* note 41.

89. The Financial Accounting Standards Board (FASB) recently voted to change accounting rules for Mortgage Backed Securities so that the balance sheet of banks better represent economic reality. Floyd Norris, *Banks Get New Leeway in Valuing Their Assets*, N.Y. TIMES, Apr. 3, 2009, at B1. The current rule required certain securities to be placed on their balance sheet at market value. *Id.* Since the market value for MBS had plummeted, many banks believed that this rule did not adequately represent the value of the

CDO prices are not acknowledged by the market to be increasing in value, then the market will still perceive the banks to be insolvent.⁹⁰ Thus, for the sake of public perception, direct equity investment may be the most obvious way to keep the banks solvent.⁹¹

VII. COULD REGULATION HAVE AVERTED THE CRISIS?

Based on my model, I identify four elements that played a large role in creating the crisis: 1) unrealistic housing appreciation,; 2) agency conflicts of securitization; 3) high leverage ratios of banks; and 4) percentage of CDOs in the bank asset portfolio. I address the role that each element played and then discuss whether regulation could have mollified each element of the crisis.

Unrealistic Housing Appreciation

As discussed in Section IV housing appreciation and prices may have been artificially high due to cheap credit.⁹² In fact, my analysis suggested that cheap credit and housing appreciation fed one another.⁹³ Expected appreciation made lending less risky because the loss-given-default became substantially lower if house foreclosure was profitable.⁹⁴ When housing prices plummeted, all the loans backed by these homes also plummeted in value.⁹⁵

It is not clear that any type of regulation would have recognized or prohibited this dangerous reverse feedback loop between lending and home prices. In a free market, rational traders should have figured out this reverse feedback mechanism.⁹⁶ They would have shorted property futures, and home values would have been kept at a rational expected appreciation.⁹⁷ If the free market could not figure this out, then it is not clear that any regulation could have prevented it.⁹⁸

MBS. *Id.* Thus, the rule has now been changed so that banks can value these securities using a discounted cash flows valuation model that better represents the long term value of these assets. *Id.*

90. See Steve Lohr, *Ailing Banks May Require More Aid to Keep Solvent*, N.Y. TIMES, (Feb. 13, 2009), <http://www.nytimes.com/2009/02/13/business/economy/13insolvent.html?adxnnl=1&adxnnlx=1315847086-jiHP+z5WKU9Li/OMvpBjaw>.

91. *Id.*

92. See *supra* Section IV.

93. See *supra* Section IV

94. See *supra* Section IV.

95. See *supra* Section IV.

96. See Robert Shiller, *Needed: A Clearer Crystal Ball*, N.Y. TIMES, May 1, 2011, at BU4.

97. See Richard M. Hynes, *Securitization, Agency Costs, and the Subprime Crisis*, 4 VA. L. & BUS. REV. 231, 260 (2009).

98. See generally, Evan N. Turgeon, *Boom and Bust for Whom?: The Economic Philosophy Behind the 2008 Financial Crisis*, 4 VA. L. & BUS. REV. 139, 178 (2009) (citing The Financial Crisis and the Role of Federal Regulators: Hearing Before the H. Comm. On Oversight & Gov't Reform, 110th Cong.

Some have argued that rating agencies should be held accountable for not having realized that housing prices were appreciating too quickly.⁹⁹ But this seems incorrect. If the majority of hedge funds that could have made a substantial amount of money on this could not anticipate this outcome, it seems ridiculous that a rating agency with no monetary motivation would have recognized the relationship. Thus any regulation could have prevented unrealistic housing appreciation.¹⁰⁰

Agency Problems of Securitization

While regulation could have alleviated the agency problems of securitization,¹⁰¹ it is not clear that this would have been enough to stop the crisis if housing prices were unrealistically high.¹⁰²

The easiest piece of regulation that might have alleviated the agency problems would have been to force each Countrywide location to hold a random subset of the loans that they generated.¹⁰³ A variation of this is actually rather common in the practice of securitization.¹⁰⁴ The originator is often asked to hold the lowest rated tranche of debt in order to ensure that the originator does not originate low quality loans.¹⁰⁵ These arrangements are usually contracted between originators and arrangers.¹⁰⁶

The above described arrangement was never forced by regulation because it was assumed that the private sector would rationally choose to enter into these arrangements. However, as the housing market boomed, arrangers became less demanding of these contracts because they were so bullish on the housing market.¹⁰⁷

149 (2008) (statement of Alan Greenspan, former Chairman, Bd. of Governors of the Fed. Reserve Sys.).

99. Cf. Nat'l Comm. on the Causes of the Fin. and Econ. Crisis in the United States, THE FINANCIAL CRISIS INQUIRY REPORT xix, (2011) ("Financial institutions and credit rating agencies embraced mathematic models as reliable predictors of risk, replacing judgment in too many instances. Too often, risk management became risk justification."), available at http://fcic-static.law.stanford.edu/cdn_media/fcic-reports/fcic_final_report_full.pdf [hereinafter FINANCIAL CRISIS INQUIRY REPORT].

100. See *supra* Section VII.

101. See generally Turgeon, *supra* note 98.

102. See generally FINANCIAL CRISIS INQUIRY REPORT, *supra* note 99, at 125.

103. When loans are securitized they are usually diced into tranches. See Louisa C. Crampton, *Originating Lender Bank Liability to Participants in the B-Tranche of a Leveraged Loan*, 1 N.C. BANKING INST. 255, 255 (1997). The lowest rated tranche will be the first to be hit by defaults. See *id.* In securitization arrangements it is actually very common to have the originator of a security hold the lowest tranche. See *id.*

104. See Jeffrey D. Clements, *Defining the Subprime Lending Problem: The View From a State Enforcement Agency*, 1668 P.L.I. CORP. 29, 40 (2008).

105. See *id.* at 41.

106. See 18 AM. JUR. 3d *Proof of Facts* § 559 (1992).

107. See Adam J. Levitin & Susan M. Watcher, *Explaining the Housing Bubble*, (U. Pa. Inst. for L. & Econ., Working Paper No. 10-15, 2010).

While regulation requiring originators to hold some portion of the loans might have alleviated the agency problems,¹⁰⁸ it is not clear how we should have known that the private sector would not rationally self-regulate this arrangement. Again, this does not appear to be bad behavior, it merely looks like overly bullish expectations. Furthermore, as I illustrated in Section V by my model, alleviating agency costs would not have stopped bank insolvency if the plunge in housing prices was drastic enough.¹⁰⁹

Overly High Leverage Ratios

The banks were probably over-levered and had there been more restrictions on leverage ratios for banks, it is possible that the banks would not have been at risk of insolvency even if the housing bubble had burst unexpectedly.

Consider the following bank balance sheet that is only levered at 10 to 1.

Assets		Liabilities	
CDO	107,500.0	Deposits	64,500.0
Other Loans	107,500.0	Long term	64,500.0
		Short term	64,500.0
		Equity	
		Equity	21,500.0

This bank would not have become insolvent in any of the scenarios that I discussed earlier. In fact, housing prices would have to decline 38 percent before banks (in my model) would be at risk of insolvency. Therefore, it seems possible that lifting the leverage restrictions on investment banks substantially contributed to the ultimate insolvency of banks.

Percentage of CDOs in the Bank Portfolio

If banks were not allowed to have so much of their assets in CDOs, then perhaps the crisis could have been averted.¹¹⁰ This is the primary purpose of the Basel system.¹¹¹ However, in this particular case

108. See Kathleen C. Engel & Patricia A. McCoy, *A Tale of Three Markets: The Law and Economics of Predatory Lending*, 80 TEX. L. REV. 1255, 1274 (2002).

109. See Jeffrey A. Miron, *Bailout or Bankruptcy*, CATO J. (June 2009), available at www.cato.org/pubs/journal/cj29n1/cj29n1-1.pdf.

110. Prior to the subprime crisis in 2007, more than \$100 billion in CDOs were issued each year. Francis A. Longstaff & Brett Myers, *Valuing Toxic Assets: An Analysis of CDO Equity 4* (Nat'l Bureau of Econ. Research, Working Paper No. 14871, 2009).

111. See W. Ronald Gard, *George Bailey in the Twenty-First Century: Are We Moving to the Postmodern Era in International Financial Regulation with Basel II?*, 8 TRANS-

it failed. This failure was due to the fact that CDOs were AAA securities.¹¹²

However, as I have discussed, the reason these CDOs were AAA securities was because the entire market was bullish on housing. It is not clear, based on my model, that these CDOs should not have been AAA if I assumed that there was true economic appreciation in housing.

Conclusion Regarding Regulation

Based on my model it seems as if the only clear regulation that could have been conceived prior to this crisis would have been requiring lower leverage ratios by banks.¹¹³ No other regulation discussed above seems as if it could have actually avoided bank insolvency based on this, admittedly, simplified model.¹¹⁴

CONCLUSION

This paper constructed a simple economic model to illustrate that only minor mispricing and poor assumptions were required to create a financial crisis. In addition, my model indicates that the only regulation that would have prevented the crisis would have been better regulation of bank leverage. The simplicity of the model limits how much it can prove and I am not suggesting that misbehavior by market participants did not substantially exacerbated the crisis. However, the model provides an important illustrative way of viewing the crisis and its origin.

ACTIONS: TENN. J. BUS. L. 161, 188 (2006) ("Minimum capital requirements continue to be the focus of Basel II, but their determination and monitoring is much more complex.").

112. See MARK JICKLING, CONG. RESEARCH SERV., RL 34412., AVERTING FINANCIAL CRISIS 4 (2008). ("Despite their complexity, [collateralized debt obligations] . . . were often able to obtain AAA ratings. . .").
113. Compare *supra* Section V (showing that where a model had a leverage ratio of 20 to 1 and 50 percent of its assets in the form of CDOs, when faced with the burst of an artificially inflated housing appreciation bubble, home loans needed only to decrease by 16.5 percent for the bank to become insolvent), with Section VII (showing that a model with a leverage ratio of 10 to 1 and 50 percent of its assets in the form of CDOs would require housing prices to decline 38% before it ran the risk of insolvency).
114. Compare discussion *supra* Section VII.1-2,4 (arguing that regulation could not have prevented unrealistic housing appreciation or the agency problems of securitization, and that regulation failed with regard to restrictions on the amount of CDOs in bank portfolios), with Section VII.3 (arguing that lower leverage ratios could have averted the crisis, even if the housing bubble burst unexpectedly).